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REMARKS

In the Office Action, the examiner rejected Claim 2 under 35 U.S.C. 103(a) as being unpatentable over Watanabe (U.S. Patent No. 3,454,404) in view of JP 9-191848 and JP 11-332496 and further in view of Boatright (U.S. Patent No. 6,426,112). The applicant respectfully disagrees with the examiner regarding the obviousness determination based on the cited references.

The inventors had investigated suitable conditions of heat treatment for removing disagreeable odor and taste remaining in the lipoxygenase-free soybeans simultaneously with drying (heat treatment) without use of pressure-resistant equipment in spite of use of sufficiently high-temperature water vapor, while still inhibiting lipid oxidation and side reaction of the protein. In the course of this investigation, the inventors found that penetration of water vapor into soybeans is prevented under atmospheric pressure, and that such water vapor treatment produces effects different from the effects by high-temperature air treatment while promoting drying.

As recited in Claim 2 previously amended, the essential features of the present invention reside in that (1) the method pulverizes lipoxygenase-free soybean grains into fine particles, (2) the method conducts a heat treatment on the fine particles with water vapor having a temperature in a range of 160 to 230°C for a time range of 30 to 300 seconds, and (3) the fine particles are

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placed under the atmospheric pressure throughout the heat treatment. The cited references do not show these essential features of the present invention as discussed in detail below.

Difference in Objective

The objective of the invention disclosed by the cited Watanabe reference is to improve the production method for defatting the soybeans as stated, for example, in the abstract of the disclosure. In contrast, the object of the present invention is to provide a method for producing soybean powder free from disagreeable odor and taste and dispersible in water in a short process with inexpensive equipment, and hence the objectives of the cited Watanabe reference and the present invention are different from one another.

In particular, according to the Watanabe technology, although a certain level of removal of the grassy smell that is peculiar to the soybean can be expected through the defatting process, trace amounts of solvent will remain attached to the defatted soybean even when desolvation with superheated hexane vapor is conducted, causing a bad smell (petroleum odor). Therefore, the present invention is far from being common in the subject and purpose with the Watanabe technology. Furthermore, since the technology disclosed by the cited Watanabe reference causes an undesirable effect on the taste, it is incompatible with taste improving technology of the present invention.

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More specifically, in the cited Watanabe reference, the activation of the lipxygenase of the raw material soybean will be retained even after the defatting process. Because of the enzyme reaction which generates n-hexanal, the substance that causes the grassy smell, may not advance owing to the fact that under the circumstances there is no unsaturated oil, the reacting opponent substance, because of the defatting operation, thus, removal of the grassy smell can be achieved. However, in the manufacture of food products, by using this defatted soybean as the raw material and mixing it with other foodstuffs containing unsaturated oil, the grassy smell will generate immediately. In other words, the removal of the grassy smell in this case is in a half-finished state, i.e, incomplete. This is because the method proposed by Watanabe is not designed to improvement the taste of soybean, but is only proposed that the defatting operation be used from the standpoint of not lowering the water soluble component ratio of the protein in the product.

Difference in Composition

In the office action, it is stated that since the cited Watanabe reference does not mention pressurization, it is equivalent that it described the superheated steam used under atmospheric pressure. However, the method of Watanabe does not use the steam (water vapor) but use the solvent vapor such as hexane vapor as stated in EXAMPLE 1. For instance, the flash point of

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hexane is -22°C , and the explosion limit concentration is 1.1 - 7.5vol%. Therefore, basically, superheated hexane solvent vapor can only be used under conditions such as normal pressure, reduced pressure, diluted concentration (below explosion limit concentration) or inert gas atmosphere in which the air is removed. At the very most, the method of Watanabe is restricted to the level in which it is used to remove the residual solvent. In other words, in the case of the method disclosed by the cited Watanabe reference, the pressure is determined by the property of the solvent. As a result, the cited Watanabe reference does not disclose the idea of using of steam specifically under the atmospheric pressure while the steam can be used under a broader range of pressure. Therefore, the cited Watanabe reference does not show the essential features (2) and (3) of the present invention.

Difference in Effect

In the office action, it is stated that although the cited Watanabe reference does not disclose the time and temperature, a person skilled in the art can easily conceive such optimum conditions. However, even if a person skilled in the art can implement the invention taught by Watanabe with the optimum conditions of time and temperature, it is not possible to achieve the effects of the present invention. The reason for this is that the Watanabe method will require the defatting process of the soybean, as well

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as, the solvent removal process for the solvent remaining in the defatted soybean, afterwards.

Thus, even if the optimum time and temperature conditions for removing the solvent remaining in the soybean are found, they will not be able to perform the effect of the present application in which foul smell and bad taste are removed and soybean powder having good water dispersion is produced, without requiring the above-mentioned two processes. In other words, the present invention achieves both the taste improvement process of soybean as well as a granule producing process in which lumped products are obtained by the rough bonding of fine powder. This is a unique effect which cannot be obtained by the method of Watanabe or by a combination of any other technologies.

The cited JP 9-191848 reference and JP 11-332496 reference show the idea of using the powderized soybean that is lipoxxygenase free. The cited Boatright reference suggests that the lipoxxygenase-free soybean still contain "beany" order. However, none of these three references show the essential feature (2) of the present invention noted above where the heat treatment by steam is performed on the fine particles of soybean. Further, none of these three references show the essential feature (3) of the present invention noted above where the heat treatment by steam is performed on the fine particles of soybean under the atmospheric pressure.

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As discussed above, since the essential features (2) and (3) of the present invention are not shown or suggested by any of the cited references, the present invention defined in Claim 2 is not obvious over the cited references taken singly or in combination. Thus, the applicant believes that the rejection under 35 U.S.C. 103(a) is no longer applicable to the present invention.

Under the circumstances, the applicant believes that the present application is in the condition for allowance, and the applicant respectfully requests that the present application be allowed and passed to issue.


Respectfully submitted,

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1/19/07

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